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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,616	09/22/2003	Masamitsu Itoh	4329.2543-01	6561

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EXAMINER

WALKE, AMANDA C

ART UNIT PAPER NUMBER

1752

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/665,616

Applicant(s)

ITOH ET AL.

Examiner

Amanda C Walke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/812688.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masataka (JP 11-271965 Patent Abstracts of Japan and partial machine translation) in view of Sato et al (JP 08-262721 Patent Abstracts of Japan).

Masataka discloses a pattern formation method utilizing a positive type chemical amplification resist containing a polymer having an acid dissociation group of an acetal type, coating the resist on a substrate, then exposing the resist in a vacuum by e-beam exposure, and finally developing the resist to form a pattern. A suitable polymer is poly(ethoxy ethyloxy styrene (35 mol %)/ hydroxy styrene (65 mol %). The photoresist composition further comprises a photoacid generator and a solvent ([0002] to [0008] and [0011] to [0016]).

Sato et al disclose a positive type resist composition having high sensitivity, high resolution, and high heat resistance, excellent in aging stability, and capable of forming a resist pattern excellent in profile shape (see abstract and page 3 of the present specification). This is achieved by replacing 10-60 mol% of the hydroxyl groups of a poly hydroxy styrene polymer with tert-butoxycarbonyloxy groups.

Given the teaching of the Sato reference that replacing the hydroxyl groups of a poly hydroxy styrene polymer with tert-butoxycarbonyloxy groups results in increased aging stability and a pattern having excellent profile shape, it would have been obvious to one of ordinary skill in the art to prepare the material of Masataka by the method of Masataka, choosing the replace 10-60 mol % of the hydroxyl groups of the hydroxy styrene polymer with tert-butoxycarbonyloxy groups to achieve the advantages discussed above, with reasonable expectation of achieving a resist pattern having a good pattern shape.

With respect to the limitation of the present claim 1 requiring a step of determining a ratio of the two dissolution inhibiting groups, as discussed in applicant's Background of the Invention, e-beam exposure is a step and repeat procedure wherein the material is exposed portion-by-portion over a period of time which may be 10 hours or longer. This means that, for example, the first area exposed with the desired pattern would be "T" and the last would be "T+ 10 hours". Given that the references discuss obtaining a resist that provides excellent aging stability and excellent resist image profile, one of ordinary skill in the art would have been motivated to maximize that ratio of the two groups to achieve the best image profile. Additionally, it is not clear as to what the expected ratio should be, thus it is not clear what amounts of each would produce the desired result, it is the position of the examiner that one of ordinary skill in the art would utilize a step of determining the optimal ratio of hydroxyl groups and tert-butoxycarbonyloxy groups to acetal groups by determining where the image profile is unchanged over time in order to optimize the image prepared.

3. Applicant's arguments filed 5/12/2004 have been fully considered but they are not persuasive.

Applicant has argued that the examiner has failed to establish a prima facie case of obviousness. As clearly set forth above, the primary reference Masataka teaches a pattern forming method utilizing a positive type chemical amplification resist containing an acid dissolution group of an acetal type and ultimately exposing the layer of resist in a vacuum by e-beam exposure and developing the layer. A suitable polymer is poly(ethoxy ethyloxy styrene (35 mol %)/ hydroxy styrene (65 mol %). The secondary reference teaches a positive type resist composition having high sensitivity, high resolution, and high heat resistance, excellent in aging stability, and capable of forming a resist pattern excellent in profile shape (see abstract and page 3 of the present specification). This is achieved by replacing 10-60 mol% of the hydroxyl groups of a poly hydroxy styrene polymer with tert-butoxycarbonyloxy groups. As stated above, it is the examiner's position that given the teaching of the Sato reference that replacing the hydroxyl groups of a poly hydroxy styrene polymer with tert-butoxycarbonyloxy groups results in increased aging stability and a pattern having excellent profile shape, it would have been obvious to one of ordinary skill in the art to prepare the material of Masataka by the method of Masataka, choosing the replace 10-60 mol % of the hydroxyl groups of the hydroxy styrene polymer with tert-butoxycarbonyloxy groups to achieve the advantages discussed above, with reasonable expectation of achieving a resist pattern having a good pattern shape. Applicant states on page 6 of the response that the examiner admits the Masataka does not teach all of the steps. This is correct, and Sato is cited to compensate the deficiencies of Masataka as discussed above.

Applicant also argues that Masataka does not teach that the resist is to be left in a vacuum. As discussed above, "as discussed in applicant's Background of the Invention, e-beam exposure is a step and repeat procedure wherein the material is exposed portion-by-portion over

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a period of time which may be 10 hours or longer. This means that, for example, the first area exposed with the desired pattern would be "T" and the last would be "T+ 10 hours". Given that the references discuss obtaining a resist that provides excellent aging stability and excellent resist image profile, one of ordinary skill in the art would have been motivated to maximize that ratio of the two groups to achieve the best image profile. Additionally, it is not clear as to what the expected ratio should be, thus it is not clear what amounts of each would produce the desired result, it is the position of the examiner that one of ordinary skill in the art would utilize a step of determining the optimal ratio of hydroxyl groups and tert-butoxycarbonyloxy groups to acetal groups by determining where the image profile is unchanged over time in order to optimize the image prepared." The examiner has clearly set forth why she believes the sensitivity would be held constant while being held in a vacuum while the resist is finishing being exposed.

Applicant has also argued that the Sato reference teaches a resist that cannot be exposed in a vacuum as aging stability which is taught to be increased by the use of Sato's material could not be exposed in a vacuum containing no amines. Sato has been relied upon solely for its teaching of replacing 10-60 mol % of the hydroxyl groups of the hydroxy styrene polymer with tert-butoxycarbonyloxy groups to achieve these advantages, not for the method of preparing the material. The primary reference teaches the step of exposing in a vacuum and given the teaching of the equivalence of the groups by Sato, when the groups of the polymer of Masataka are replaced with those of Sato it is believed that the polymer can be exposed in a vacuum and would still result in the advantages taught by Sato for one to expect.

Finally, as clearly set forth above in the preceeding rejections, the examiner has explained when made, the material of Masataka in view of Sato, prepared by the method of

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Masataka and by replacing the hydroxy groups of Masataka with the tert-butoxycarbonyloxy groups of Sato (an action which is taught to be result in the advantages of high heat resistance, excellent aging stability, and capable of forming a resist pattern excellent in profile shape), would meet the limitations of the present claims.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

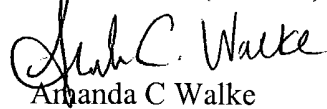
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C Walke whose telephone number is 571-272-1337. The examiner can normally be reached on M-R 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866/217-9197 (toll-free).



Amanda C Walke
Examiner
Art Unit 1752

ACW
October 18, 2004

CYNTHIA H. KELLY
SUPERVISORY PATENT EXAMINER
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